**The Reasons for Seasons Exploration**

By now you know that it is warmer in the summer and cooler in the winter, but why? It turns out that it is **not** because we are closer to the sun. In this exploration you will explore the true cause of the seasons.

**Background:** Earth revolves (orbits) around the sun and its axis is tilted at a 23.5 degree slant. Although Earth’s position around the sun may change, the slant does not. Earth’s northern hemisphere is always pointing toward a far off star, the North Star, also known as Polaris.

**Instructions**

1. Open Ms. Cloutier-Simons’ wikipage and access the link to today’s Seasons Interactive (<http://highered.mcgraw-hill.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/78778/Seasons_Nav.swf::Seasons%20Interactive>)
2. Take a few minutes to play around with the buttons and to watch the revolution of Earth around the sun. Locate the following:
   1. daily temperature thermometer
   2. the orbit of Earth
   3. the angle at which sunlight hits the earth
   4. the Inclination Angle (tilt of Earth’s axis)
   5. the date window (with season and time)

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| 1. Keep Earth’s tilt (inclination angle) at **zero** degrees and record your observations in the spaces below.   **Earth’s Tilt Angle: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   * 1. Draw an image showing the angle at which the sunlight hits the Earth’s ground in the box below.   2. Record the **range of temperatures** that the Earth experiences in the spaces below. A **range** includes the lowest temperature to the highest temperature.   **Winter temperature range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Spring temperature range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Summer temperature range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Fall temperature range: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  Sunlight Angle on the Earth . |

1. **Change** Earth’s tilt (**inclination angle) to 23 degrees**, the angle at which the Earth actually tilts. Record new observations about changes in temperature and the angle at which the sunlight hits the earth in the chart below. Don’t forget to look at which direction the top of Earth’s tilt is pointing as it revolves around the sun!

**Earth’s Tilt Angle: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Season** | **Temperature Range** (minimum to maximum) | **Sunlight Angle** (Draw the angle at which the light hits the ground) | **Where is the top axis of Earth pointing?**  (To the sun, away from the sun, neither to or away from sun) |
| **Winter**  January 21-March 21 |  |  |  |
| **Spring**  March 21-June 21 |  |  |  |
| **Summer**  June 21-September 21 |  |  |  |
| **Fall**  September 21-January 21 |  |  |  |

1. Draw a diagram that shows Earth’s orbit as it revolves around the sun. Label the direction of tilt and each of the four seasons.

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| **Analysis & Conclusion Questions**  *All answers must be written in* ***complete sentences*** *and* ***written on page \_\_\_\_ of your ISN***   1. **How** does a change in the **sunlight angle** change the temperature of the planet? **Explain the effects** below **using data** from your chart above. 2. In **which direction** (toward, away from the sun, or neither) is the Earth pointing during the following events:  * Winter Solstice – 12/21 * Spring equinox - 3/21 * Summer Solstice – 6/21 * Fall Equinox - 9/21  1. From this simulation, can you guess what a **solstice** is? What is an **equinox**? Describe what is happening to the sunlight angle on these days. 2. **Explain why** it is summer in Earth’s northern hemisphere at the same time it is winter in the southern hemisphere. 3. **Wha**t is the true cause of the seasons? 4. **What** would happen to the seasons if the Earth did not have a tilt? |